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ABSTRACT

Four cities in Norway, Sweden, and Denmark have been engaged since 1977 in a joint study of the junior level of elementary school. (More than 5,000 pupils are involved in the study.) The Department of Education at the University of Turku joined the project in the autumn term of 1979. The purpose of the Swedish project, reported here, was to investigate, with particular attention to specific reading and writing disabilities, the cognitive and socioemotional development of children during the first three years of school. (About 700 children took part in the study.) Practical aims of the project were to improve clinical investigations of remedial education and to provide guides for planning educational assistance for children with reading and writing disabilities. Screenings utilizing multiple measures at each of three test times were made at the end of grade one (spring term 1977), at the beginning of grade two (about 6 months later), and halfway through grade three. An underachieving pupil group was defined on the basis of the results of the first and second screenings. Subsequently, a comprehensive process of investigation and treatment for the underachieving group was started at the end of the autumn term in grade two. Results are discussed. (Author/RH)

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Title of project	Learning problems of junior level children - a Nordic joint research project
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FOCUS OF THE PROJECT

BACKGROUND

Remedial teaching accounts for a substantial and steadily growing proportion of elementary school resources in the Nordic countries. Every year billions of Swedish kronor are invested in various kinds of support for pupils with special needs. One tendency common to all the Nordic countries is that the utmost efforts are being made to integrate remedial teaching with regular school work, with the result that remedial classes of various kinds are rapidly being phased out. But one issue which has caused increasing concern to policy makers, school managers and teachers is whether the money invested hes been well spent. Are aid measures effective? If not, how can remedial teaching be improved? Thus there is a great demand for a deeper knowledge concerning the conditions and potentialities of remedial education.

This is the general background to the co-operation of Nordic research efforts which has been given the code name the Bergen Project. It began at the initiative of Professor Hans-Jörgen Gjessing at the University of Bergen. Four Nordic municipalities - Bergen (Norway), Umeå (Sweden) and Køge-Vallø and Lyngby-Tårbaek (Denmark) have been engaged since 1977 in a joint study of the junior level of elementary school involving the participation of more than 5 000 pupils. The Department of Education in the University of Turku joined the project in the autumn term of 1979. The local projects are co-ordinated at Nordic level via the Secretariat for Nordic Cultural Co-operation of the Nordic Council of Ministers in Copenhagen. The present report is a summary of the Swedish sub-project, which is an independent project in many ways but at the same time resembles the other projects closely enough in terms of general design and instrument selection for comparisons to be possible.

PURPOSE AND PROBLEMS

The aim of the project has been to help deepen our knowledge of the cognitive and socio-emotional development of children during the first three years of school. The inter-Nordic approach, involving a follow-up of pupil generations in five quite different municipalities, also affords opportunities of gaining a better understanding of the development process as a form of interaction between the individual and situational factors. But the main emphasis of the project can be said to be on children developing learning problems at school. In Umeå we have concentrated particularly on specific reading and writing disabilities, whereas the Norwegian and Danish municipalities have also devoted attention to more general learning problems. Apart from its more scientific aims, the project has also had practical aims, the intention being to help bring about concrete improvements to clinical investigations into remedial education, and in this connection we have developed quite a number of new diagnostic methods. We have also been anxious to make concrete suggestions regarding the planning of educational assistance to children with reading and writing disabilities.

STRATEGY

About 700 children took part in the study in Umeå. The first phase began at the end of grade 1 (spring term 1977) with a comprehensive survey of cognitive development (Raven's matrixes), reading (OS 400 word reading test), spelling (a common Nordic word dictation based on the content of the various readers), school attitudes (Happy and Grumpy - a questionnaire) self-image (Flagchild and Balloonchild - a questionnaire), sociometry (choise of playmate and choice of working partner), and teacher assessments of linguistic comprehension, use of language, rough motor skills, precision motor skills, social and emotional adjustment, reading, writing and underachievement.

Parts of this programme (OS 400, word dictation and Raven) were repeated at the beginning of grade 2 (about 6 months later) to stabilize the foundation on which underachieving pupils were selected for closer study and to provide a measuring point for the general follow-up study. The last broad survey of the entire population took place halfway through grade 3, using partly modified and partly new instruments adapted to the current development level. This survey covered cognitive development (Raven), reading (OS 400, S 50 - a reading comprehension test - and teacher assessments of technical reading proficiency and of reading comprehension), writing (word dictation-DLS 3, teacher assessments of spelling and of written expressive capacity), mathematics (teacher assessments of arithmetical proficiency and problem solving ability), school attitudes (a questionnaire), level of aspiration (choice of notional tasks posing demands at different levels), self image (a questionnaire), sociometry (choice of playmate and choice of working partner), social and emotional adjustment in school (teacher assessments), and linguistic development (teacher assessments). These three surveys of the entire pupil group are referred to below as Screening I, II and III respectively. They incorporate important information concerning the development of pupils and classes at junior level, and in part they are also reported as separate studies. Above all, however, they are used as reference data to elucidate the development of pupils with specific difficulties in acquiring skills concerned with the written language (dyslexia).

UNDERACHIEVEMENT

This pupil group was defined on the basis of the results of Screenings I and II. The selective criteria concerned underachievement in reading and/or writing, a distinct difference

between the pupil's level of proficiency and cognitive ability (measured by Raven) being critical. A statistical regression model was applied and the results of the reading and writing tests checked against the Raven scores. The regression line then shows the level of proficiency which can normally be expected at different levels of cognitive capacity. Pupils far below this anticipated level can be termed underachievers in the sense that they read or write far worse than they ought to do in view of their cognitive capacity. We now have two or more problems of principle with a definition of this kind, but we can solve at least one of them, namely the meaning of "far below", i.e. the definition of the critical region, and, secondly, the risk of a pupil coming within this region merely by unfortunate coincidence. We solved the latter problem by repeating the critical measurements at the beginning of grade 2 (Screening II). Only the pupils who came in the critical zone in both screenings and thus displayed stable underachievement were included in the group for closer study. There is no objective solution to the first problem, concerning the point where the line should be drawn; this is partly a question of arbitrary statistical judgment. We chose a fairly narrow limit, and our correlation chart was made to include a confidence band of 10 per cent in relation to the regression line. Thus underachievement occurs by definition at all ability levels. With this procedure, 49 pupils out of a total of 705 came to be defined as stable underachievers. Following consultations with the teachers, three pupils who displayed certain grave disturbances were excluded. Of the remaining 46 pupils (6.5 per cent approx.), 38 were boys and 8 girls. This conspicuous imbalance between the sexes tallies well with similar international studies in which both neurological and sociological explanations are usually put forward to account for the striking differences between the sexes. We will refrain from speculations of our own for the

time being. A reference group for the underachievers was also defined on the basis of Screenings I and II. Each pupil in the underachieving group was given a "twin" from the same class of the same sex and at the same Raven level. Reading and writing achievement, however, were very close to the regression line i.e. the children read and wrote fully on a level with their intellectual potentialities.

THE DI-BE PHASE

A comprehensive process of investigation and treatment for the underachieving group (referred to here as the Di-Be phase) was started at the end of the autumn term in grade 2. The various parts of the inquiry are summarized in the following diagram.

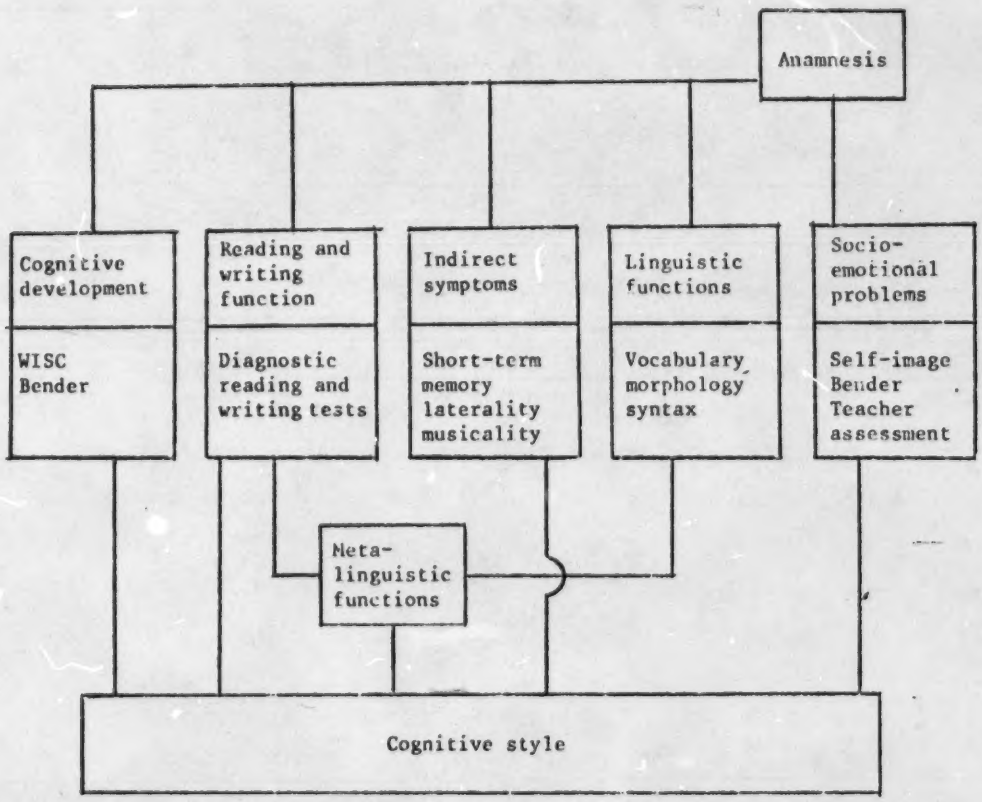

Fig 1. The various components of the inquiry in the Di-Be phase

With regard to cognitive development, the non-verbal Raven test was supplemented by the more versatile WISC test, in which special profiles in the sub-test results are more interesting than the general level. Bender can furnish an indication of maturity level as well as signs of emotional disturbances.

Perhaps the most critical diagnosis from a pedagogical viewpoint concerns deeper understanding of the actual reading and writing function. It was established in the screening that there were difficulties involved with the written language. The task now, therefore, was to ascertain more exactly how these problems were manifested. Quite a comprehensive battery was developed, based excessively on Gjessing's Norwegian diagnostic reading and writing tests. Here as with many other Di-Be operations, the conduct of the inquiries and the interpretation of findings demanded quite a high level of competence. As part of the project and over a period of several terms, a cadre of 14 experienced remedial teachers were trained and put in charge of the practical conduct of the Di-Be programme at the various schools.

Reading and writing difficulties were often accompanied by a number of indirect symptoms which can help to shed light on the type of disturbance involved in different cases. Limitations of time and capacity forced us to make a drastic selection which, in the light of what we now believe ourselves to know about the reading process, was perhaps not the best possible. We studied different sides of the pupils' auditive and visual short-term memory, various aspects of laterality (right and left handedness and eyedness, left-right concepts and suchlike), together with musical ear.

We also tried to get to grips with various sides of the pupils' linguistic functions which had not been captured very well in

the teacher assessments, namely vocabulary, morphology and syntax. Unfortunately, linguistics has often treated the lingquistic development of children as though it were practically complete before they started school, with the result that very little study has been made of the linguistic development of schoolchildren and there are not really any good diagnostic methods for the linguistic functions of children in the age group with which we are concerned. We were therefore obliged to develop instruments of our own which leave a great dcal to be desired where measuring techniques are concerned.

An importance bridge between general linguistic ability and reading and writing exists in the form of metalinguistic functions or linguistic awareness, i.e. the ability of children momentarily to disregard the significative aspect of language and concentrate instead on language as form. Phoneme sensitivity, ability to analyse words in phonemes and ability to synthesize phonemes are thus highly critical factors in the mastery of reading and writing. Special attention has been devoted to this developmental factor in Umeå, and this has gradually resulted in fairly independent projects.

Of course, the problems relating to reading and writing instruction cannot be viewed solely as manifestations of disruptions of certain cognitive and linguistic functions. A comprehensive appreciation of the pupil is bound to include his self image in various respects. We have in fact devoted particular attention in Umeå to the interaction between self image and reading instruction. In the Di-Be phase, the pupils' self images were studied by means of a newly constructed test, "It's about me", in which the pupils were asked to comment on a large number of statements.

In all the test situations employed, and in the tasks given to the pupils, it was possible to observe various signs of the pupils' cognitive style. Some of them got down to the tasks with a striking degree of impulsiveness and delivered rapid answers, often sheer guesses, while others were pensive and pondered for a long time, sometimes almost for a compulsive length of time, before venturing to answer. In a special test involving many similar options, a study was made of the pupils' cognitive style as manifested by the relationship between their reaction time and the number of correct answers given. In addition the class teachers and remedial teachers together assessed the pupils' working methods in different work situations.

This comprehensive diagnostic programme formed the basis of individually designed aid measures. One of the guiding principles of this work was that the pupils in the Di-Be group were not a homogeneous collection but displayed a variety of disturbances requiring different kinds of educational treatment. This hypothesis of subgrouping or different types of dyslexia has been further articulated by Gjessing in Bergen, who posits the following forms of dyslexia: auditive, visual, auditive-visual, emotional and pedagogical. One of the purposes of the project was to study more closely the feasibility of a similar grouping. At all events, the aid programmes were based on the assumption that different forms of dyslexia required different aid measures.

SOME OF THE MAIN RESULTS

Needless to say, a project of this magnitude incorporates quite a considerable potential of data analyses, and numerous findings have been reported; see list or references. For various

reasons, however, the inter-Nordic comparisons have not been carried very far, nor have the longitudinal potentialities of the project yet been fully utilized. Space will only permit us to quote a few illustrative examples of what the project has been able to yield up till now.

THE SCREENING STUDIES

One central question concerns the development of the pupils' reading and writing skills and the way in which variations in those skills can be understood in the light of other screening variables. We are immediately struck by the considerable individual variations. As regards reading proficiency, for example, there are pupils who at the end of grade 1 are only capable of reading individual words correctly in an interval of fifteen minutes, while others can cope with practically all the 400 words included in the test (OS 400). A quarter of the pupils only attain 100 words, if that, while the best quarter can cope with more than 200. In figure 2 we can see how reading proficiency distinctly improves between the three tests (10 min. limit.) But the pupils tend on the whole to retain their relative positions. The variation occurring in grade 3 is at least as great as in grade 1. We can also see that the Swedish pupils are quite superior to the Danish pupils in grade 1. Figures do not include Norwegian data, but at the fifteen-minute limit the Swedish average is 152 and the Norwegian 138. Swedish reading instruction in grade 1 therefore seems to progress more rapidly than in the other municipalities. Smaller classes and favourable grouping arrangements may also have contributed towards the difference. In grade 3, however, the Swedish lead appears to be reduced. No corresponding differences have been established in the Raven scores, which suggests that we are faced here with pedagogically induced variations.

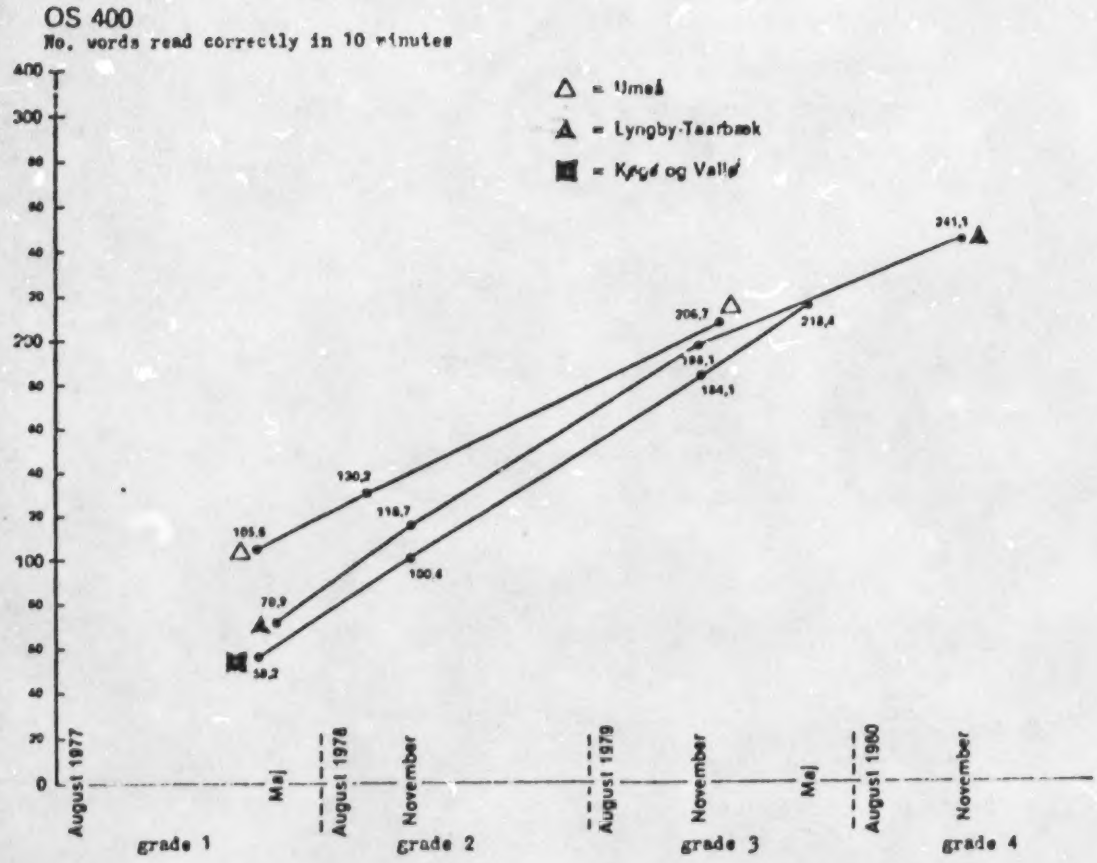

Fig 2. Comparison of reading development in three Nordic municipalities

Even in a relatively homogeneous school organization like Umeå's, we find considerable variations in class averages and standard deviations regarding basic skills. In reading, for example, class averages at the first test range from 63 to 227. The underachieving pupils are very unevenly distributed between the 44 classes taking part. Thus it is hardly reasonable for auxiliary resources to be evenly allocated in a municipality if one wishes to cater for actual needs.

AID analysis provides one possible means of sizing up the factors which have a critical bearing on explaining the variations in

basic reading and writing skills. We will start with the whole of the survey population (N=785), in the square on the extreme left in figure 3.

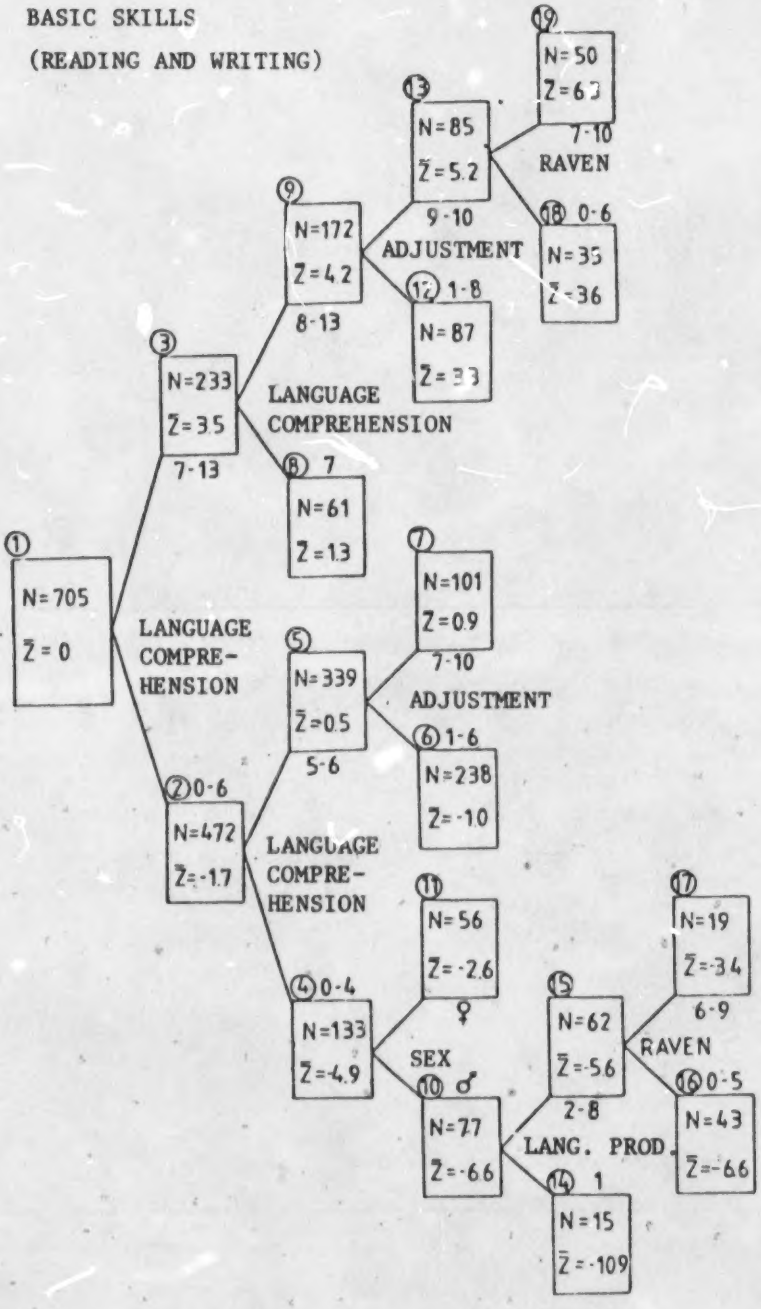

Fig 3. AID analysis of data from Screenings I and II

We have transformed the values in such a way as to zero the mean. The analysis now involves splitting up this large group into progressively smaller ones which will be more and more homogeneous in terms of basic skills. Each subdivision is based on the factor which is most conducive to this type of homogenization. Thus the first subdivision is founded on "language comprehension" and gives us groups 2 and 3, i.e. a low group with an average of -1.7 for basic skills and a high group with an average of + 3.5. Thus Group 2 has a low level of language comprehension (0-6) while Group 3 comes high in terms of this variable (7-13). These groups are then subdivided further, still on the basis of language comprehension. Let us now, for example, follow groups 19 and 14 respectively back to the starting position. Group 19 comprises 50 pupils with very good basic skills (+6.3). They have high Raven scores (7-10) and they come from a group which is socially and emotionally well adjusted (9-10) and has a high level of language comprehension (8-13). Group 14 on the other hand has extremely poor basic skills (-10.9). These pupils are distinguished by low language production (1), they are boys and have a low level of language comprehension (0-4). The same chart tells us a great many other things besides. In Group 17, for example, we find individuals with high Raven scores who nontheless have low levels of reading and writing achievement (-3.4). These pupils are boys with a low level of language comprehension. Group 18 comprises pupils with low Raven scores but good reading and writing skills (+3.6). These pupils have clearly been able to offset their deficient cognitive potentialities with very good socio-emotional adjustment and with a high level of language comprehension.

The AID technique often needs to be treated with caution, because it is very liable to yield structures which are really of quite a random nature. Here, however, we are on firmer ground, because practically identical structures have been obtained

from Norweigan data and also from the subsequent screenings. The most conspicuous finding in all the analyses conducted so far is the heavy priority of the language factors, especially the language comprehension variable. This variable comprises the sum total of teacher assessments of different aspects of the pupils' ability to apprehend and comprehend the spoken language in different situations. The assessments were made during a three-week observation period, before any other tests were administered, so that they cannot have been influenced by the results of the latter.

In order to penetrate the effects of more subtle variables such as self image, sociometric status, sex, age, size of class, type of locality etc., more subtle analyses are required which will do justice to the interaction of different factors. In the case of sexual differences regarding basic skills, for example, we find that girls have a slight but significant lead. Dividing the material into different levels of language comprehension, however, one finds a very pronounced difference at the lowest level of language comprehension, while in the group with a high level of language comprehension, girls and boys read and write with more or less equal proficiency. The effect of sociometric status is only apparent in comparisons between extreme groups, in that the most isolated pupils seem to have more than average difficulty in coping with basic skills at school.

One of the most important questions remaining to be elucidated is why some children display positive development in their first three years at school and why some develop (relatively speaking) in a negative direction regardless of their initial level. This question may also concern classes as units. But in order to understand the interaction of individual factors and situational or environmental variables, or in order to under-

stand which educational environments are good for which individuals, we need a great deal more information than is now available concerning class climates, teachers' instructional styles and attitudes, domestic environmental pressures and so on. Important contributions can be made here by the other municipalities taking part.

THE DI-BE PHASE

As stated earlier, there were 46 pupils (38 boys and 8 girls) in the underachieving or dyslexia group, and the reference group included the same number. One of the first questions asked was whether these groups differed in terms of socio-economic background factors, for it is a widespread and perhaps well-founded view that pupils with problems at school often come from problem homes. But the anamnestic interviews of parents of dyslexic children in their homes revealed a supremely normal picture, and in most cases it seemed difficult to put the pupils' problems down to shortcomings of the domestic environment. This impression was confirmed by a closer analysis. In 33 cases of 46 we successfully matched the dyslexia group with the reference group in terms of parental occupations, educational levels and income status. In the remaining 13 cases we found a negligible superiority of educational status on the part of the reference group parents. The logical conclusion was that underachievement was connected more with individually related than with social problems. Furthermore, it was established that the majority of parents had sufficient resources and motivation to play an active part in educational assistance.

The dyslexic group and the reference group were compared in a number of respects and considerable differences were found for nearly all variables except Raven, which was one of the matching variables. Reading and writing differences, of course, were

particularly great. But the dyslexic pupils also come appreciably lower as regards socio-emotional adjustment, self image, level of aspiration and sociometric status. For example, a quarter of the dyslexic pupils are in complete social isolation (according to the sociometric study), as against only 6 per cent of the reference group.

The hypothesis of the heterogeneity of the dyslexic group has been confirmed, although Gjessing's categories have not been entirely apparent in the analyses performed so far. One distinct subgroup, however, comprises pupils with poorly developed metalinguistic functions. By and large they exhibit the symptom picture of auditive dyslexia, i.e. deficient decoding, errors of confusion and simplification, and a disposition to guesswork. Systematic training in sound analysis and synthesis was a particularly effective form of assistance for these pupils. The spelling ability of this subgroup developed better than that of the reference group or the other dyslexic pupils. But the results of the Di-Be phase will have to be processed a great deal further before any more definitive pronouncements can be made concerning the nature of dyslexia. Since the Nordic municipalities have in some respects progressed at different speeds during the latter part of the project, it has not yet been possible to utilize Di-Be information from the other municipalities as a means of shedding light on the Swedish findings.

The most important practical objectives of the projects can nonetheless be said to have been achieved.

- A viable model of remedial investigation, focussing particularly on reading and writing disabilities, has been developed and practically tested.

- In connection with this model and on the basis of current research, various diagnostic methods have been evolved concerning analyses of the reading and writing process and including broader cognitive and socio-emotional aspects of development.

- Concrete aid programmes have been drafted and practically tested. The exercises incorporate differentiation facilities, so that allowance can be made for the individual nature of these difficulties. The aid measures are not only concerned with reading and writing functions; they also include language, cognitive style and self-reliance. We have also shown how parents can take part in this work.

- By means of INSET and study circles, we have helped to raise the competence of those who are responsible for everyday remedial instruction in schools. The Municipality of Umeå has made a sterling contribution here, since one of the members of the project team has been able to spend several terms as a consultant and has actively implemented the experience accruing from the project.

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